Versatile Manipulation for Assistive Free-Flyers

Completed Technology Project (2016 - 2019)

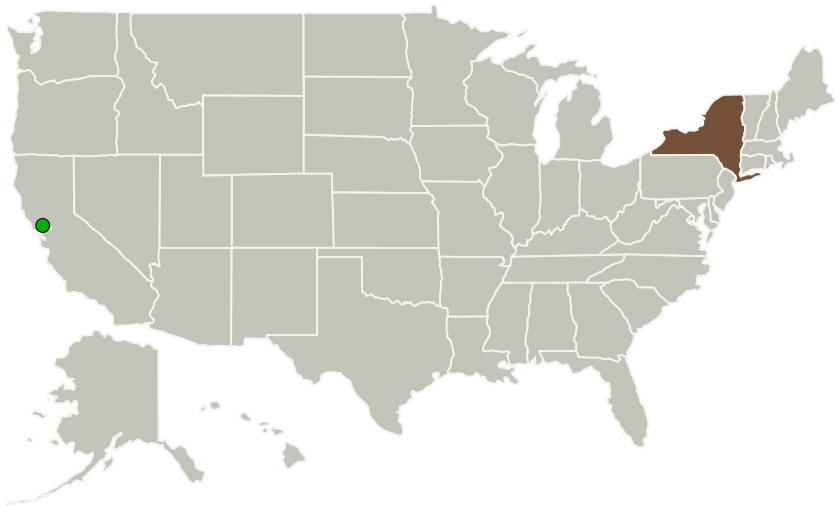
Project Introduction

Assistive Free-Flyers (AFFs) are flying robots designed to share the living space with human astronauts in orbit. These robots have shown the potential to assist astronauts with tasks such as surveillance, inspection, and mapping. However, AFFs are currently designed without manipulation capabilities, and can thus be deployed mainly for sensing and observation. In this project, we aim to provide AFFs with the capability to physically interact with the environment through manipulation. We plan to equip AFFs with compact yet dexterous robotic arms and hands developed in this project, along with the planning and control methods needed to operate them. We aim to demonstrate new capabilities on tasks such as object acquisition and transport, part insertion and extraction, button or lever operation, docking and perching. We believe these abilities will greatly increase AFFs' reach, literally and figuratively.

Anticipated Benefits

We aim to demonstrate new capabilities on tasks such as object acquisition and transport, part insertion and extraction, button or lever operation, docking and perching. We believe these abilities will greatly increase the reach of Assistive Free-Flyers, literally and figuratively.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Columbia University in the City of New York	Lead Organization	Academia	New York, New York
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations
New York

Project Website:

https://www.nasa.gov/strg#.VQb6T0jJzyE

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Columbia University in the City of New York

Responsible Program:

Space Technology Research Grants

Project Management

Program Director:

Claudia M Meyer

Program Manager:

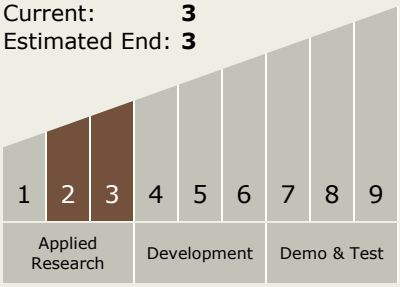
Hung D Nguyen

Principal Investigator:

Matei Ciocarlie

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX04 Robotic Systems
  - TX04.3 Manipulation
    - TX04.3.2 Grappling Technologies

Target Destination

Earth